

Универзитет „Св. Кирил и Методиј“
Педагошки факултет „Св. Климент Охридски“ – Скопје
Република Македонија

Ss. Cyril and Methodius University
Faculty of Pedagogy “St. Kliment Ohridski” – Skopje
Republic of Macedonia

**VI меѓународен балкански конгрес за образование и наука:
СОВРЕМЕНОТО ОПШТЕСТВО И ОБРАЗОВАНИЕТО**

(Охрид, 29. IX - 1. X 2011г.)
Зборник на трудови

**VI International Balkan Congress for Education and Science:
THE MODERN SOCIETY AND EDUCATION**

(Ohrid, 29. IX - 1. X 2011.)
Book of proceedings

Skopje, 2011

За издавачот:

Проф. д-р Владо Тимовски, Декан на Педагошкиот Факултет
„Св. Климент Охридски“ – Скопје, Република Македонија

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“St. Kliment Ohridski” – Skopje, Republic of Macedonia

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CIP - Каталогизација во публикација

Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

37(062)

БАЛКАНСКИ конгрес за образование и наука (6 ; 2011)

Современото општество и образованието / VI Балкански конгрес за образование и наука = The modern society and education / the VI international balkan congress for education and science. - Skopje: Pedagoški fakultet "Sv. Kliment Ohridski", 2011. - 1466 стр. : илустр. ; 23 см

Фусноти кон трудовите. - Библиографија кон трудовите

ISBN 978-9989-823-33-6

1. Насп. ств. насл. - I. International balkan congress for education and science (6 ; 2011) види Балкански конгрес за образование и наука (6 ; 2011)

а) Образование - Собири

COBISS.MK-ID 89314314

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APPLICATION OF INNOVATIVE MODELS IN TEACHING METHODS FOR NATURE AND SOCIETY STUDIES AND STUDENTS' SUCCESS

Abstract

This paper deals with the issue of shaping and applying innovative models in the teaching subject *Teaching methods for nature and society studies* in the conditions existing in our schools. Most teachers show the need for a modern methodical transformation of program contents for teaching nature and society studies and the display of models of educational organization of classes. Therefore the theoretical part of the work is directed toward consideration of innovative approaches in *Teaching methods for nature and society studies*, which asked for an indication of the theoretical basis for starting with the selected models, comparison of the traditional and the modern concept of teaching nature and society studies, pointing out the most important items and the underdeveloped competences of teachers and students for modern teaching practice, as well as the elaboration of those learning and teaching strategies that are underrepresented in today's teaching of nature and society studies, and which are necessary if we want to increase the level of students' success.

Key words: *Teaching methods, nature, innovative models, competences, teaching, students.*

Introduction

Education theorists agree that all of the current school reforms have been largely restricted to external changes including reforms of the curricula, changing the length of schooling, changes in school organization, changes of instructional goals and objectives and the like. No reform of education has been more deeply involved in reforming education so far, and it is our duty now to put this in the foreground. Changing the curriculum is the foundation from which a new basis of the teaching process further grows out that move the role of teachers and students and remove forever all the modes in which the student is passivized. Reforms,... we all want them, but we are often not aware of what they bring along.

Teachers in pedagogical and didactic theory come across general guidelines for innovation of teaching, such as: instruction should not be conceived for memorizing facts and concepts, definitions and phenomena, but to respect individual differences among students, and to enable students to develop their

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knowledge independently etc. But such requirements induce no response if they are not seen and reshaped into precise and specific methodological guidelines aimed at the actual program content. The introduction of innovation will be facilitated by providing complete teaching materials that will help teachers to apply these innovations in practice more easily. The application of modern educational technologies does not involve only the modernization of schools with new and modern teaching aids, but it also gives clear instructions for delivering active forms and methods in the context of current curricula. The teacher must know how to combine modern methods, forms and methods of teaching, i.e. what the advantages and disadvantages of such models are, and in which frameworks they can be successfully applied in our teaching practice.

In the attempt to avoid generalized didactics and out of desire to leave strict methodology which can easily turn into routine and bare practice, the basic idea was to show the ways in which innovative models of teaching organization are formed in teaching the subject Nature and society studies, i.e. the effect they have on the students' success, or which dimensions the teacher has to take into account in order to meet the framework of the contemporary teaching of nature and society studies. Previous requirements constituted the basis for designing innovative models of learning in teaching Introduction to nature and society in the third grade for this job. The aim is to demonstrate innovative models of learning, from the initial idea to the final shape, with special emphasis on limiting circumstances during application, the conditions for their success, as well as their empirical confirmation by measuring the success of the student.

Intentional causes for writing this paper lie in the fact that in our teaching practice there are extremely rare empirical studies that aim to check the success of the application of contemporary models of learning and teaching, in junior elementary school. Schools and education within the European Union offer their own proposals for modernizing of the teaching in our schools, but only as examples and ideas that need to be upgraded to suit the conditions of our teaching practice. Models of learning and teaching for teaching the subject Introduction to nature and society that will be suggested in this paper rely on the achievement of the teaching practice and the compatible subject in the European Union under the title "Science" and "Primary science", but tailored to the requirements of the teaching program for the subject Introduction to nature and to the application conditions in our schools.

Traditional concept of teaching Nature and Society

Traditional teaching about nature and society has its basis in the traditional theories of education, starting from Pestalozzi to Herbart, Dewey and Kerschensteiner. These ideas represent a unilaterally understood intellectualism because they observe education unilaterally. Therefore, traditional teaching of nature and society advocates intellectualism on the one hand (accumulation of knowledge and facts, verbosity, excessive student load, the inability to apply what is learnt because of misunderstanding) and lowering of the educational level on the other side. Also, traditional teaching of nature and society does not take into account equal respect and development of educational, correctional and functional tasks of teaching. Such teaching ignores the formation of attitudes and learning of positive human qualities,

the formation of the scientific view of the world, and it pays the least attention to training students how to learn and how to think, so they are not prepared for continuing education.

The current teaching of nature and society is still largely traditional: “Traditional education is a combination of teacher presentations and demonstrations of teaching aids. In this form of teaching we can observe the dominance of the verbal method and the dominant status of teachers who provide ready-made information with a high degree of guiding the students' cognitive processes and the lack of students' activity” (De Zan, 2001).

The logic of the relationship between general and specific knowledge in the development of science is different from that in didactic settings, so the development of programs and the determination of the order of learning should start from the logic of the relationship between general and specific knowledge in the development of science from which the teaching content is taken. The given curriculum, which represents the traditional approach, is also called into question, because knowledge is no longer the goal of education. The modern approach to the curriculum promotes flexibility, adaptability, holistic approach, processes aimed at teachers and students, as well as their interactive-communicative relationship. So the basic elements of curriculum management are: content and scope of the curriculum, balance between different subjects, direction of curriculum, and integration of subjects and contents. (Kostović, 2006).

The curriculum development in the field in nature and society should therefore be oriented towards the determination of the contents of terms, rules and laws that students should learn, then towards the resources by means of which they could understand and learn them, towards the abilities needed to be developed at the same time, attitudes and other educational components of personality that should be emphasized during classes, while the program contents should be taken flexibly. This would imply that teachers do not blindly follow the contents of the textbooks and that they get rid of rigidities in planning and focus on the outcomes of teaching. It is extremely important to leave some room to students to influence the contents they learn and the way they learn. Through the program contents of teaching nature and society the teacher leads students in the learning process, providing assistance and support.

As Sidenko (2006) says, in the teaching theory and practice today two pedagogies are shaped, two different conceptual paradigms of shaping the learning environment - the so-called pedagogy of knowledge and the pedagogy of skills, in the background of which are two schools – “school of memory” and “school development”. Analogous to the table given by Sidenko, we are showing comparative characteristics of traditional teaching of nature and society oriented towards knowledge and innovative teaching of nature and society oriented towards abilities:

“Memory teaching” lies on the traditional basis: the class-lesson system of learning, the dominance of the illustrative-lecturing method, the frontal form of the teaching process organization, the control and examination of the reproductive type, etc. The purpose of this kind of teaching nature and society is the formation of

knowledge, skills and habits. So, with this teaching style the student's memory is what is developed most.

"Teaching development" focuses on the development of skills and personalities of students. Personality development is demonstrated through learning the reasoning operations, and as a criterion for learning these thinking operations we work with concepts as a necessary condition for their formation. While doing this, attention is paid to the importance of the organization of students' activities in class.

Table 1. Comparative characteristics of traditional and innovative developing teaching of nature and society

Comparison parameters	Traditional teaching of nature and society	Innovative developing teaching of nature and society
<i>Goal</i>	Transfer of knowledge, skills and habits	Pupil's personality development
<i>Motto</i>	"Do as I do", "I am above you"	"Do not harm", "I am with you"
<i>Basic characteristic</i>	Teaching "memorizing"	Teaching developmental abilities
<i>Character and style of mutual action</i>	Subject – object, monologue, authoritarian	Subject – subject, poly-logical, democratic
<i>Organization forms</i>	Frontal, individual	Group work, pair work
<i>Teaching methods</i>	Informative, reproductive	Problem approach, reflexive
<i>"Learning formula"</i>	Knowledge – reproductive activity	activity – reproduction – knowledge, creation of the "success" situation
<i>Learning styles</i>	Learning by heart, reproduction, activity according to an algorithm	Explorative thinking activity
<i>Basic teacher's functions</i>	Information carrier, propagator of the subject-disciplinary knowledge, keeper of norms and traditions	Organizer of cooperation, consultant, manager, assistant
<i>Pupil's status</i>	Passivity, absence of interest	Activity, presence of motivation and interest
<i>Guiding principle</i>	"deflection" (under pressure)	"nurturing"

Modern concept of teaching Nature and society

Modern teaching of nature and society is based on the need to enable student through the program contents to be an active individual the society of knowledge. In the late nineties of the 20th century learning has become a priority area in the development of education policies of European countries, including ours. At the end of the year 2000 the European Commission has adopted a Memorandum on Lifelong Learning which stresses that lifelong education can no longer be just one aspect of education and training, but needs to become a leading educational principle aiming to develop a coherent education policy for Europe. Contemporary concepts of lifelong learning are based on the belief that everyone is able to learn, that everyone must develop motivation for learning and that individuals need to be encouraged to practice lifelong learning. Philosophy of lifelong learning implies a shift from education to learning. The realization of lifelong learning depends largely

on the ability and motivation to take care of one's own learning (Milutinovic, 2006).

The modern concept of teaching nature and society is based on the concept of teaching focused on action, i.e. on integrative learning. For such instruction it is necessary to understand the changing role of schools and education in the lives of children and young people. School should be seen as a comprehensive experience space, in which active treatment of the real things becomes a leading maxim of the organization of teaching and learning. In such a way, a "bad" reality outside school with its limited opportunities for experience is being opposed by definite educational endeavor.

The modern concept of teaching nature and society respects the foundations of the revolutionary model of learning (Dryden, Vos, 2004):

- today everyone is both a teacher and a student,
- for most people learning is most effective when it is fun,
- if we ensure appropriate environment, most children will show a great amount of self-directed learning,
- good teachers today can make miracles by means of interactive electronic communications,
- people learn best when they want to learn, and not in some period of life determined in advance,
- when students are completely involved in learning even the difficult information can easily be learned and memorized,
- brain research shows that intelligence in the right environment can be improved,
- each of us has the learning style that is as individual as our fingerprints, so the school should recognize it,
- at each step it is necessary to use real world as your classroom, and in order to learn something you also need to do it.

Methodological frame of the research

The main problem of this research is how to make modern teaching of the subject *Introduction to nature* more efficient. This subject has interdisciplinary character and its basis lies in an even more complex subject. Most teachers find *Introduction to nature* difficult in all teaching activities, from planning and modeling to evaluation of the student. From the so far identified and comparative analyses from domestic and foreign activities for teaching *Introduction to nature* the following problems can be reported: program contents overloaded with facts and not adjusted to students' abilities, frequent improvisations of interpretation of nature and its laws, anthropocentrism, major difficulties in the methodical transformation of content, and low teacher motivation for applying novelties.

The teaching of the subject *Introduction to nature* today must foster a "learning culture". Instead of memorizing facts and practicing encyclopedic knowledge and formalism students should master rational learning techniques, and teachers should use techniques that activate students, motivates them for independent learning, creative work and application of knowledge in real everyday life. The center of a modern teacher's job is in teaching methods used with students.

By applying innovative models of work a teacher should develop new competences, i.e. his/her work should acquire new quality.

The methodological transformation of the subject contents of *Introduction to nature* should be based in innovative learning models. The goal of this paper is to shape in detail the concrete – practical innovative models in teaching the subject of *Introduction to nature* that would include the following ways of learning and teaching: problem learning (learning by solving problems and learning based on a problem), learning by discovering, learning by means of computers, group work, pair work, method of guiding students' independent work, differentiated and individualized tasks.

For this research it is important to collect and systematize data about the condition in teaching nature and society in our elementary schools. It is necessary to analyze the theoretical findings about respective manners of teaching. After that it is necessary to shape the existing respective ways of learning and organizing of students into original models of teaching *Introduction to nature* (creating methodological packages with adequate methodological material).

The subject of this research is theoretical and practical study of students' achievement by applying innovative models in teaching nature and society. Students' achievements with the application of innovative models of teaching will be studied based on learned knowledge, habits and skills of students about nature and society in junior elementary school.

Goals and tasks of the research

The goal of the research is to establish the effects on students' success that resulted from the application of the experimental program (innovative models of work in teaching nature).

A special goal of the research is aimed at shaping innovative models of work based on the experimental program in teaching *Introduction to nature* in the third grade of elementary school.

On the basis of the objectives it is necessary to realize the following research tasks:

1. To collect data on overall students' success and the success in nature and society;
2. To perform an initial testing to see how much of the program contents of nature and society in the experimental and control groups is learned;

Hypotheses of research

Based on the theoretical approach to the problem, the goal and the task of this research the following starting hypotheses are formed:

Basic hypothesis (X₀) and alternative hypothesis (X_a) are as follows:

(X₀) It is assumed that the application of innovative teaching models for *Introduction to nature* will have no impact on increasing students' success, increasing the quantity and quality of knowledge, as well as on the increase of students' interest in the learning contents from the field of nature.

(Xa) It is assumed that the application of innovative teaching models for nature will facilitate students' success and increase students' interest in learning contents from the field of *Introduction to nature*.

Research types

The planned research is operational and developmental. The research is oriented towards modifying and improving the immediate educational practice in the third grade of elementary school.

The research focused on studying the teaching of *Introduction to nature* in the present, as well as in the future.

Balancing groups per overall success variable at the end of the first half

For the intended pedagogical experiment it was necessary to consider the overall success of the students of experimental and control groups at the end of the first half of third grade, because the experiment was done in spring, i.e. in the second half of the same grade.

Table 2: Overall students' success at the end of the first half of the school year of the third grade

Name of school	Class		Number	Excellent		Very good		Good		Satisfactory	
				Бр.	%	бп	%	Бр.	%	Бр.	%
"Braka Miladinovci"- Probistip	III ²	E1	28	20	71.43	3	10.71	3	10.71	2	7.14
	III ³	E2	26	19	73.1	4	15.4	2	7.7	1	3.8
"Nikola Karev"- Probistip	III ¹	E3	27	22	81.5	3	11.1	1	3.7	1	3.7
	III ²	E4	28	21	75.0	3	10.8	2	7.1	2	7.1
Total E group			109	82	75.2	13	11.9		7.4	6	5.5
"Braka Miladinovci"- Probistip	III ¹	K1	29	21	72.4	5	17.3	2	6.9	1	3.4
	III ⁴	K2	26	18	69.3	6	23.1	1	3.8	1	3.8
"Nikola Karev"- Probistip	III ³	K3	29	22	75.9	5	17.3	1	3.4	1	3.4
"Nikola Karev"- Probistip	III ⁴	K4	28	20	71.5	4	14.3	2	7.1	2	7.1
Total K group				81	72.3	20	17.8	6	5.4	5	4.5
Total K and E groups				163	73.8	33	14.9	14	6.3	11	5.0

The overall success at the end of the first half of the school year is expressed based on the number and the percentage of students with excellent, very good, good, satisfactory and unsatisfactory success, and on the mean grade of the classes for the experimental and control group, and for each class separately, and is given in Table 1.

Based on data from Table 1 it can be concluded that the experimental and control groups balanced according to the number of students with positive success

(E – 75.2%, K-72.3%) and negative success (E - 5.5%, K – 4.5%). Group E has a slight advantage in the number of students with excellent success (53.2%) compared to group K (59.0%). In the category of very good success the students are well balanced.

Table 3: Overall students' success at the end of the first half - of the school year of the third grade for Introduction to nature

Name of school	Class		N	Excellent		Very good		Good		Satisfactory		Total positive		Total negative	
				N	%	N	%	N	%	N	%	N	%	N	%
“Braka Miladinovci”- Probistip	III ²	E1	28	13	46.4	8	28.6	2	7.1	5	17.9	28	100	0	0
	III ³	E2	26	16	61.5	5	19.3	3	11.5	2	7.7	26	100	0	0
“Nikola Karev”- Probistip	III ¹	E3	27	15	55.6	7	25.9	4	14.8	1	3.7	27	100	0	0
	III ²	E4	28	14	50.0	6	21.4	5	17.9	3	10.7	28	100	0	0
Total E group			109	58	53.2	26	23.9	14	12.8	11	10.1	109	100	0	0
“Braka Miladinovci”- Probistip	III1	K1	29	17	58.6	5	17.2	2	6.9	3	10.4	27	93.1	2	6.9
	III4	K2	26	15	57.7	6	23.1	2	7.7	2	7.7	25	96.2	1	3.8
“Nikola Karev”- Probistip	III3	K3	29	18	62.1	7	24.1	2	6.9	2	6.9	29	100	0	0
“Nikola Karev”- Probistip	III4	K4	28	16	57.1	8	28.6	3	10.7	1	3.6	28	100	0	0
Total K group			113	66	59.0	26	23.2	9	8.0	8	7.1	89	97.3	3	2.7
Total E and K groups			221	124	56.1	52	23.5	23	10.4		8.6	218	98.6	3	1.4

If we analyze the overall school success of classes the following will be observed: while E group as a whole leads in the number of students with excellent success, K3 control class has most excellent students (62.1%). The experimental class E4 has the least excellent students (61.5%). In the category of very good success the experimental class E2 has only 19.3% of such students, compared to E1 and E4, which have 50.00% of students with very good success. The experimental group has only one student with satisfactory success (1.22%), while the control group does not have any students with such success. From the stated above, we see that the classes are very diverse in structure, which in junior grade school is not uncommon.

Table: 4 Innovative model in the teaching of the subject *Introduction to nature*

MODEL	
TEACHING TOPIC	Flora and fauna
TEACHING UNIT	Division of the living world into kingdoms
CLASS TYPE	Presentation and review (2 classes)
CLASS GOALS	Systematization of the acquired knowledge of plants and animals and the introduction of new criteria for grouping of living organisms.
CLASS TASKS	
a) educational	Expanding the students' knowledge about living organisms. Learning the new way of dividing and grouping of living organisms into five kingdoms: monera, protista, fungi, plants and animals.
b) educationally	Development of students' team work and achievement of mutual cooperation.
c) functional	Enabling students to distinguish microorganisms, plants, animals, and fungi.
TEACHING METHODS	A) verbal – textual: the oral method (dialogue), the method of the written word (work on a text); B) illustrative - demonstrative: illustration with paintings and drawings, demonstrations of natural materials; C) method of managing pupils' independent work (long-term experiments)
TEACHING FORMS	Group, frontal.
TEACHING AIDS	Computer, LCD projector
TEACHING TOOLS	Teaching books, paintings, natural material, tweezers, magnifying glass
STUDENTS' ACTIVITIES	Research, mini-project, recording, evaluation, grouping, asking questions, reporting, asking questions
FORMS OF LEARNING	Participatively, cooperatively conceived.
CLASS ARTICULATION	1. Preparational task: How does mold develop? 2. Students' reports about the task done. 3. Group work. 4. Groups' reports.
METHODICAL GUIDELINES	Students should be given a preparatory research task 4-5 days before, with which a problem task is created in the introductory part of the class. During class students work in heterogeneous groups of 4-5 students. Students are reminded that it is necessary to choose one student in the group who reads best and will read the material to the group. Then everyone should think about what he/she does not understand and ask questions about it in the group. After group discussion, they make a concept for their presentation to the other groups in the class. The group should elect a reporter. One of the members should draw a natural material, while another member should describe its appearance.

Preparational task: *How does mold develop?*

You need: a slice of bread, a plastic bag

Procedure:

Put a slice of bread in a plastic bag. Leave the bag in a place outside the refrigerator. Every day, watch what happens to the bread. Write into your notebook: Homework, then the name of the task, and then make a table similar to this and there record what you observe.

The course of the class

Introduction

The class starts with a conversation with the students.

- What creatures have you been familiar with so far? (Plants, animals, people.)
- What do you think, are there other living beings on this planet? (There probably are.)
- Have you heard of bacteria, viruses, fungi ...? (Yes, we have.)
- Where do these living creatures belong? (Maybe they are animals.)
- Are fungi plants? (Yes, they are.)
- And if I tell you that fungi feed on ready food as animals, will you still argue that fungi are plants? (No.)
- Why? (Because plants themselves produce food.)
- Are then fungi animals? (Yes.)
- However, they are not. Your task is to learn during this class how living things are grouped in today's science and what their basic characteristics are.
- Does anyone want to ask a question about this?
- The students questions should be written on the board. Some possible questions asked by students are:
 - What are fungi?
 - Where do bacteria and viruses belong?

All these questions for students are problem questions to which they will find answers on their own.

Central part

Students work in groups of 4. Each group gets a similar instructional sheet. The difference is in the last task.

The instructional sheet

- How are living things grouped in today's science?
- In order to get answers to this question you must carefully analyze the paper sheet you got.

ANSWER:

Based on your preparatory task about mold, write to which kingdom mold belongs. Write it into the table!

Now try to answer the following questions:

What are fungi? _____

Are bacteria animals?

YES

NO

Can we see viruses with the naked eye?

YES

NO

Conclusion

The general conclusion of research is: adequate use of innovative models of teaching of nature and society that are based on cooperative learning, learning through joint problem solving, learning through discovery, research directed learning, differentiated requirements for students, multiple communication in the classroom and direct contact with sources of knowledge (natural materials, educational software, internet, ...) leads to a significant increase in student achievement and thus contributes to enhancing the effectiveness of teaching nature and society studies. The quality of students' knowledge is improving, because learning, understanding and application are emphasized, and students gain skills they need for further study of educational content from the area of nature and society studies.

Traditional models of learning in the teaching of nature and society studies operate only in the field of reproductive learning of facts and recognition of concepts and phenomena, and are poor triggers of students' thinking processes. Although teachers know the benefits and basic organizations of those forms of learning were the foundation of innovative models of teaching nature and society included in this study, some resistance to their use in teaching is still present. So here an attempt is made to eliminate the many ambiguities by directing teachers to manners of implementing the selected models. Continuous professional development of teachers for the implementation of innovative ways of learning in teaching nature and society studies are a condition of a wider application of the proposed and similar models of work.

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